A Day in the Life of Your Heart

Abstract

Did you know that your heart beats at different rates depending on what you're doing? The more physically active you are, the faster your heart beats. You can measure the rate your heart is beating by taking your pulse. This science fair project will show you how to take your pulse and help you investigate which daily activities get your heart beating the fastest.

Objective

Track your heart rate throughout the day to see which activities cause it to beat faster.

Introduction

"Lub-dub, lub-dub, lub-dub." That is the sound the doctor hears when he or she uses a stethoscope to listen to your heart. The doctor listens to make sure the heartbeat sounds normal and has a regular, steady rhythm. But did you know that you can figure out how fast your heart is beating without a stethoscope? This is done by taking your pulse.

Human Biology and Health Science Project the human heart

Figure 1. The human heart, like the one pictured above, is a muscle that pumps blood to all other parts of the body. (Wikipedia, 2008.)

Every time the heart beats it is pushing out blood, which is full of oxygen, throughout your body. This oxygenated (which means full of oxygen) blood travels throughout your body in tubes called blood vessels. The cells in your body remove the oxygen from the blood as it travels by and use the oxygen to energize and stay healthy. By placing your fingers over a blood vessel close to the surface of your skin, you can feel the pulse of the blood rushing through the blood vessel every time your heart beats. If you count the number of pulses you feel in 1 minute, you will know how fast your heart is beating. But if you are trying to figure out what your heart rate is immediately after exercise or another physical activity, it is better to only count the pulses for 10 seconds and then multiply that number by 6 to get the number of pulses in 60 seconds (1 minute). That's because the heart recovers quickly from physical activity, and to get the most accurate data about how quickly the heart was beating during the activity, it is important to measure as quickly as possible after the activity. Equation 1, below, shows the formula for calculating heart rate.

Equation 1:

heart rate = (# of pulse beats in 10 seconds) × 6

Do you know what your heart rate is? It changes throughout the day, depending on how much energy you're using. The more physically active you are, the more oxygen you need, which means your heart has to beat faster to move all the oxygenated blood around. Which of your normal activities do you think makes your heart beat the fastest? What time of day is your heart rate the slowest? In this science fair project you'll find out the answer to these questions by measuring your pulse several times throughout the day as you do different activities.

Terms, Concepts and Questions to Start Background Research

\* Stethoscope

\* Pulse

\* Blood vessel

\* Cell

\* Heart rate

\* Carotid artery

\* Radial artery

Questions

\* What is the range of heart rates for a healthy person?

\* How does the heart pump blood?

\* What effects do exercise and physical activity have on heart rates?

Bibliography

This website will give you more information about how the heart and blood vessels work.

\* Baffa, G. (2005, March). Your Heart & Circulatory System. Retrieved June 18, 2008 from http://www.kidshealth.org/kid/htbw/heart.html

Materials and Equipment

\* Stopwatch

\* Lab notebook

\* Graph paper

Experimental Procedure

Practice Taking Your Pulse and Calculating Heart Rate

Before starting your experiment, it is important that you have practiced taking your pulse and using that data to calculate heart rate.

1. There are two spots usually used to take a pulse: the carotid artery in the neck and the radial artery in the wrist. Arteries are large blood vessels that carry blood from the heart to the rest of the body. Figure 2 shows the location of both these arteries.

1. For descriptions on how to find these spots, check out the Learn2 Take a Pulse website.

2. Practice finding and taking pulse measurements from both spots and decide which is easiest for you.

Human Biology and Health Science Project person taking his own pulse

Figure 2. These photos show a person taking his own pulse using the carotid artery, located in the side of the neck, and the radial artery on the inside of the wrist.

2. Press the fingertips of your index and middle fingers over either the radial or carotid artery. Gently wiggle your fingertips around until you feel a steady, rhythmic pulse. Don't push too hard.

1. Never use your thumb to take a pulse. Thumbs also have strong pulses and you might confuse the pulsing of your thumb with the beating of the pulse you're trying to measure.

2. If you are measuring the pulse in the carotid artery, never measure it on both sides of the neck at the same time and do not massage that area of the neck (just press gently with two fingers instead). Both these actions can interrupt blood flow and cause fainting or loss of breath.

3. Once you've found the pulse, use your other hand to start the stopwatch. Or have a helper run the stopwatch for you.

4. Using the stopwatch to keep track of the time, count the number of beats you feel in 10 seconds.

5. Multiply the number of beats in 10 seconds by 6 to get the total number of beats in 1 minute (which is 60 seconds). This calculation is illustrated in Equation 1 in the Introduction.

1. Although heart rates are described in beats per minute (bpm), you will only measure your pulse for 10 seconds and then multiply by 6 to calculate beats per minute. Your heart goes back to pumping at regular speed very quickly after exercise or physical activity. So if you measure past 10 seconds, your heart rate will nearly be back to normal already, which would not help you figure out what the rate was when it was beating quickly.

Collecting Your Heart Rate Data

Once you've got the hang of taking your pulse and calculating your heart rate, you are ready to start your experiment. The goal is to measure your heart rate several times throughout the day.

1. Take your pulse first thing in the morning, before you've even gotten out of bed. This is your resting heart rate. Record the data in a table, like the one below, in your lab notebook.

1. Take your pulse within the first 5 minutes of waking up.

2. While taking your pulse, you should either still be lying down or have just sat up in bed. Make sure to take your pulse before you get out of bed.

3. You might want to put your stopwatch, lab notebook, and a pen next to your bed the night before so that you have all the equipment you need the next morning to take your pulse without getting out of bed.

2. Choose four more times of day to take your pulse. Try to pick things that you do at a similar time every day so that it will be easy for you to repeat the pattern again each day. Try to space out the activities you are measuring over the whole day.

1. Two of the activities should be quiet activities. Some examples are:

\* Reading a book

\* Playing a board game or computer game

\* Watching TV

\* Eating a meal or a snack

\* Riding in the car

\* Drawing, painting, or working on some other art project

2. Two of the times should be while you are doing physically active tasks. Some examples are:

\* Running around at recess

\* Playing a sport

\* Dancing to music

\* Jumping rope

\* Climbing, running, or jumping at the playground

\* Actively playing with your friends, parents, or siblings

3. Make sure to record what you were doing, what time of day you were doing it, and your pulse rate each time in a data table in your lab notebook.

3. Take your pulse just before you go to sleep, while you are lying or sitting in your bed. Record the data in your lab notebook.

Day Time of Day Activity Pulse (beats per 10 seconds) Heart Rate (bpm)

Day 1 Waking up

4. Repeat steps 1-3 on two more days for a total of three days' worth of data (each with six activities). Try to make the three days as similar as possible, doing the same activities at the same times of day.

Analyze the Data

1. Using Equation 1, change your pulse data into heart rate data for each time of day and activity. Record the heart rate data in the data table in your lab notebook.

2. Make a line graph showing your heart rate data.

1. You can make the graph by hand or use a website like Create a Graph to make the graph on the computer and print it.

2. Put the heart rate data on the y-axis. Label your activity and the time of day on the x-axis.

3. Make one line for each day's worth of data.

3. Look at the three lines representing your data. Do they follow the same pattern? When was your heart rate the lowest? What activity made your heart beat the fastest?